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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,882	12/31/2003	Charles Steven Korman	147029-1	8885

6147 7590 05/01/2007

GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
PATENT DOCKET RM. BLDG. K1-4A59
NISKAYUNA, NY 12309

EXAMINER	
HALL, ASHA J	

ART UNIT	PAPER NUMBER
1709	

MAIL DATE	DELIVERY MODE
05/01/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/749,882	KORMAN ET AL.	
	Examiner	Art Unit	
	Asha Hall	1709	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-16 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-16 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 12/31/2003.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4 and 8-14 rejected under 35 U.S.C. 103(a) as being anticipated by Brandhorst (3,989,541) in view of Kariya (6,140,570).

In regards to claims 1-4,8, and 9, Brandhorst discloses a photovoltaic/solar cell assembly in Figure 1, for use in an outer space environment or a non-Earth environment, comprising (col.1; lines: 11-15):

(a) a photovoltaic conversion layer (10) configured to produce an electrical current when receiving photons (col. 3; lines: 60-63), said photovoltaic conversion layer (10) having a top surface (14) and a bottom surface (13);

(b) a first electrical contact layer/electrode electrically coupled to said top surface and a second electrical contact layer electrically coupled to said bottom surface (col.4; lines: 25-30);

(c) first electrical contact layer (14) configured to receive electrons from an outer space environment (col. 1; lines: 11-15) and to conduct said electrons away from said photovoltaic conversion layer

(d) a second layer of titanium dioxide (col.4; lines: 25-30)

Brandhorst fails to disclose the thickness and the emissivity of a transparent electrically conductive layer constructed from indium tin oxide (ITO) and zinc oxide (ZnO). Kariya discloses a photovoltaic device (Figure 1) and further discloses a transparent electrically conductive layer (103) is constructed from indium tin oxide (col. 21; lines: 58-62) and zinc oxide (col. 5; lines: 8-17) with a thickness of 50-300 nanometers with an emissivity/intermediate layer (col. 6; lines: 45-48) disposed between the transparent electrically conductive layer (103) and the first electrode/metallic back reflecting layer (102). Kaisha teaches that a transparent and electrically conductive layer is interposed between a back reflecting layer and a metallic material as the back reflective layer, and the transparent and electrically conductive layer is designed to have a surface provided with a irregular structure (or a textured structure), thereby providing improved light absorption efficiency (col.2; lines: 50-55). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a transparent electrically conductive layer of Kaisha in the photovoltaic device of Brandhorst in order to provide for improved light absorption efficiency.

In regard to claims 10-14, Brandhorst discloses a method for reducing electro-static discharges/internal resistance losses (col.1; lines: 29-41) in a solar cell assembly used in an outer space environment or a non-Earth environment (col.1; lines: 10-15), the method comprising:

(a) receiving electrons from an outer space environment to a layer (14) covering at least a portion of a solar cell (col.2; lines: 52-61);

(b) conducting said electrons through said the layer (14) away from said solar cell so that said electrons do not pass through said solar cell (col.1; lines: 58-60).

(c) a second layer of titanium dioxide (col.4; lines: 25-30)

Brandhorst fails to disclose the thickness and the emissivity of a transparent electrically conductive layer constructed from indium tin oxide (ITO) and zinc oxide (ZnO). Kariya discloses a photovoltaic device (Figure 1) and further discloses a transparent electrically conductive layer (103) constructed from indium tin oxide (col. 21; lines: 58-62) and zinc oxide (col. 5; lines: 8-17) with a thickness range from 50-300 nanometers with an emissivity/intermediate layer (col. 6; lines: 45-48) disposed between the transparent electrically conductive layer (103) and the first electrode/metallic back reflecting layer (102). Kaisha also teaches that a transparent electrically conductive layer is attached to a metallic material back reflecting layer, and the transparent electrically conductive layer is designed to have a surface provided with a irregular structure (or a textured structure), thereby providing improved light absorption efficiency (col.2; lines: 50-55). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a transparent electrically conductive layer of Kaisha in the photovoltaic device of Brandhorst in order to provide for improved light absorption efficiency.

3. Claims 5,7, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brandhorst (3,989,541) and Kariya (6,140,570), in view of Chang et al. (5,405, 680).

In regard claim 5,7, and 16, modified Brandhorst discloses the photovoltaic device where portions reflect solar radiation (col.2; lines:13-16) as discussed with regards to claims 1 and 10 respectively, but fails to disclose an emissivity of the transparent electrically conductive layer configured to have an emissivity greater than or equal to 0.8 (col. 11;lines: 26-31).

Chang et al. discloses materials, which reflect solar radiation (col. 3; lines: 3-8), and further discloses an emissivity material with a high emissivity level equal to one to reflect portions of the light in the 8-13 μm wavelength region (col.11; lines 24-25). Chang et al. teaches that the material is matched to the emissivity level that is responsive to that wavelength region (col. 11; lines: 26-31). It would have been obvious to one of ordinary skill in the art at the time of the invention to set the emissivity level of the anti-reflective coating greater than 0.8 taught in Change et al. to the transparent electrically conductive layer (103) of Kariya, in order to match the wavelength region of the incident radiation.

4. Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brandhorst (3,989,541) and Kariya (6,140,570), in view of Thomas et al. (4,488,047).

Brandhorst discloses the photovoltaic device in Figure 1 as in claim 1 and 10 respectively, but fails to disclose the transparent electrically conductive layer to absorb wavelengths less than 5 microns in length.

Thomas discloses a photovoltaic device/solar concentrator (Figure 1) and further

discloses a layer configured to absorb at least 0.4-1.8 μm wavelengths of light (col. 3; lines: 21-26) by way of having each layer of the multilayered device absorb at different wavelength in order to enhance the solar radiation collection (col 4; lines: 24-31). It would have been obvious to one of ordinary skill in the art at the time of the invention to receive solar radiation at wavelengths of 0.4-1.8μm of Thomas to the solar concentrator of Brandhorst in order to enhance the solar radiation collection.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asha Hall whose telephone number is 571-272-9812. The examiner can normally be reached on Monday-Thursday 8:00-6:30PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AJH

ALEXA D. NECKEL
SUPERVISORY PATENT EXAMINER